Earth Science Data and Information System (ESDIS) Project Update

April 28-29, 2009

Goddard Earth Sciences Data and Information Services Center (GES DISC) User Working Group Meeting
ADNET Systems Facility
7515 Mission Drive, Suite A100
Lanham, Maryland 20706

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ESDIS Project, Code 423

NASA GSFC

Earth Science Data and Information System (ESDIS) Project

The ESDIS Project is responsible for operating the Earth Observing System Data and Information System (EOSDIS)
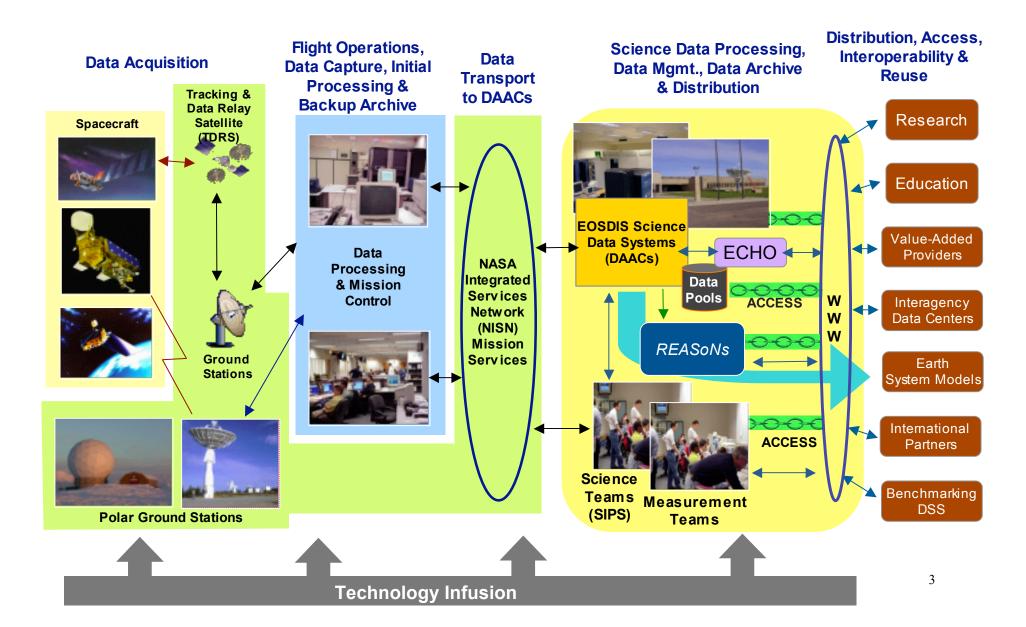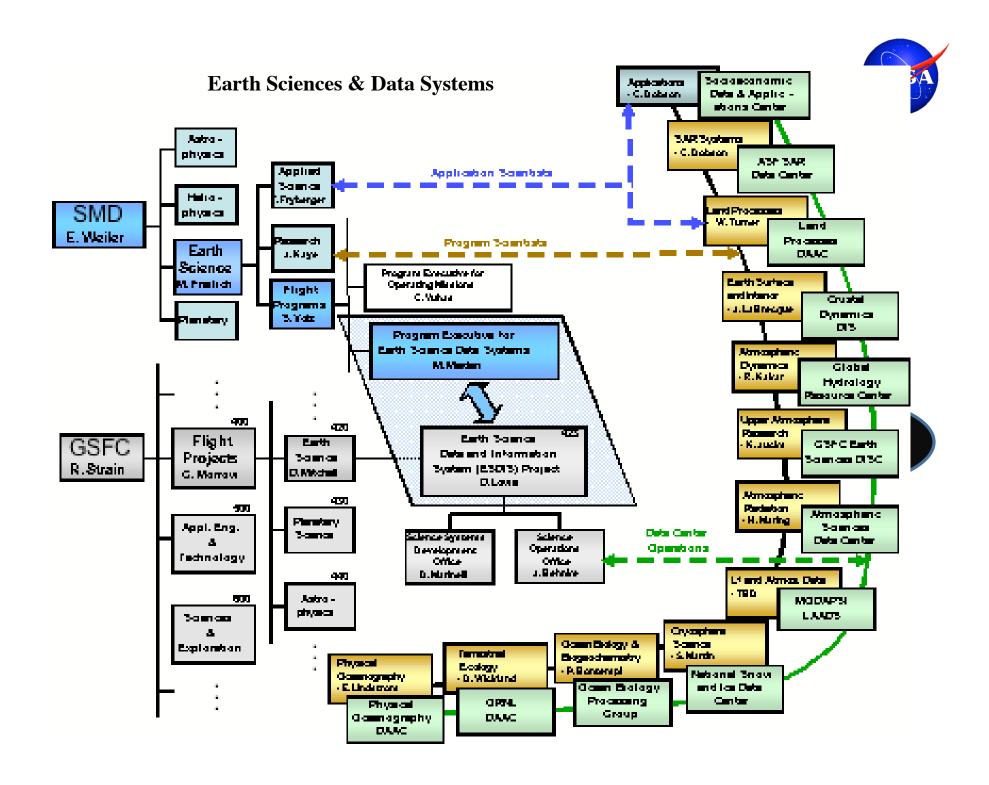
- EOSDIS:
  - Ingests, archives, processes, and distributes science data for NASA's EOS missions (e.g., Terra, Aqua, Aura, ICESat)
  - Supports unique data requirements for a variety of Earth science disciplines (e.g., land, atmosphere, snow/ice, and ocean) as well as inter-disciplinary researchers, climate modelers, and application users (e.g., U.S. Forest Service)
  - Employs state-of-the-art hardware and software technology to achieve required data throughput

ESDIS Project Supports		
Science System Elements	Data Centers	12
	SIPS	14
Interfaces	Interface Control Documents	32
Partnerships	US	8
	International	13
Missions	Science Data Processing	10
	Archiving and Distribution	38
	Instruments Supported	87

EOSDIS System Architecture

Data Acquisition

Flight Operations, Data Capture, Initial Processing & Backup Archive

Data Transport to DAACs

Science Data Processing, Data Mgmt., Data Archive & Distribution

Distribution, Access, Interoperability & Reuse

Spacecraft

Tracking & Data Relay Satellite (TDRS)

Ground Stations

Polar Ground Stations

Data Processing & Mission Control

NASA Integrated Services Network (NISN) Mission Services

EOSDIS Science Data Systems (DAACs)

ECHO

Data Pools

ACCESS

REASoNs

Science Teams (SIPS)

Measurement Teams

ACCESS

WWW

Research

Education

Value-Added Providers

Interagency Data Centers

Earth System Models

International Partners

Benchmarking DSS

Technology Infusion

3

Earth Sciences & Data Systems

Earth Science Data & Information System (ESDIS) Project Code 423 Organizational Chart

Deputy Associate Director of Flight Projects for EOS Operations
D. Lowe
Secretary – D. Trakas

Deputy Project Manager
S. Ambrose

Deputy Project Manager/Resources
S. Metcalf

Assistant Project Manager
H. K. Ramapriyan

Procurement Manager
N. Shah 200

Contracting Officer
G. Boger 200

ESDIS CSO
C. Sigman 585

System Manager
K. Michael 580

Financial Manager
N. Turner

EED Acquisition Lead
C. Schroeder

Resource Analyst
K. Krokos

Resource Analyst
Vacant

Resource Analyst
B. Haskell

Science Systems Dev. Manager/EMD COTR
D. Marinelli

Science Operations Manager
J. Behnke

423

System Engineering
580

Development & Sustaining Eng.
580

DAAC Engineers
586

Net. Sys. Eng.
585

Outreach/ User Support
586

System Engineer
D. Marinelli (acting)

Hardware Manager
C. Bock

Evolution/Software Dev. Mgr
F. Lindsay

ECHO Development & Ops
A. Mitchell

GES DISC — **J. Moses**
A. Koslosky
S. Bailey

EMS — **K. Murphy**

ICDs — **A. Hall**

K. Kranacs

C. Boquist

5

EOSDIS Facilities

Data centers, collocated with centers of science discipline expertise, archive and distribute standard data products produced by Science Investigator-led Processing Systems (SIPSs)

ASF DAAC
SAR Products
Sea Ice, Polar Processes

CDDIS
Crustal Dynamics
Solid Earth

SEDAC
Human Interactions
in Global Change

NCAR, U of Col.
HIRDLS, MOPITT, *SORCE*

LP DAAC
Land Processes & Features

GSFC
GLAS, MODIS, OMI, OBPG

GES DISC
Atmos Composition & Dynamics, Global Modeling, Hydrology, Radiance

OBPG
Ocean Biology & Biogeochemistry

Key

Data Center

SIPSs

NSIDC DAAC
Cryosphere, Polar Processes

JPL
MLS, TES

ORNL DAAC
Biogeochemical Dynamics, EOS Land Validation

LAADS/MODAPS
Atmosphere

San Diego
ACRIM

LaRC
CERES, *SAGE III*

PO.DAAC
Ocean Circulation
Air-Sea Interactions

GHRC
Hydrological Cycle & Severe Weather

GHRC
AMSR-E, *LIS*

ASDC
Radiation Budget, Clouds, Aerosols, Tropo Chemistry

6

EOSDIS Performance

ESDIS measures EOSDIS performance through metrics and a survey of customer satisfaction. Results are available to ESDIS and data centers.
- Using COTS tools, each data center provides metrics to a central system, EMS
- Using an OMB approved survey, once a year all users are asked to comment on satisfaction with EOSDIS and performance at data centers

EOSDIS Metrics (Oct. 1, 2007 to Sept. 30, 2008)	
Unique Data Sets	>3,700
Distinct Users of EOSDIS Data and Services	>600K
Web Site Visits	>800K
Average Archive Growth	2.3 TB/day
Total Archive Volume	~3.7 PB
End User Distribution Products	> 150M
End User Average Distribution Volume	5.4 TB/day

GES DISC is a major contributor to EOSDIS
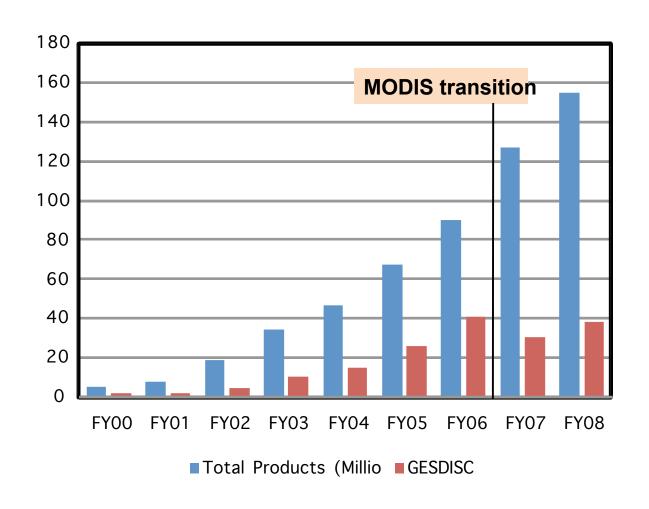
FY2008 Metrics

Parameter	EOSDIS	GES DISC	GES DISC %
DATA			
Ingest Volume (TB)	640.1	64.3	10%
Archive Volume (TB)	823.04	98.34	11.9%
Product Distribution (M)	155.66	38.75	24.9%
Data Users	158,576	50,943	32.1%
WEB (Visits of 1 minute or more)			
Web Visits	819,906	143,781	17.5%
Web Views	8,202,931	1,636,681	20.0%
Web Visitors	513,327	82,771	16.1%

EOSDIS Product Distribution

Top 10 Products in FY2008
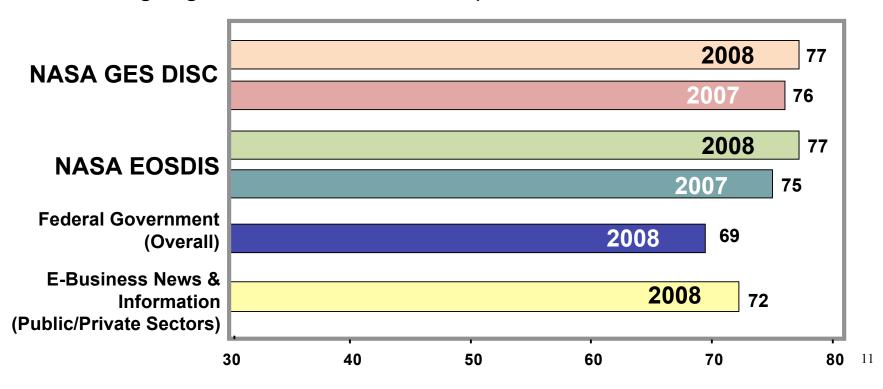
	Product	Description	Files	GBs
	Top 10 EOSDIS Products Distributed By Files			
1	AIRX2RET	AIRS/Aqua FINAL Level 2 Products (Without HSB)	9,410,738	16,731.67
2	MYD04_L2	MODIS/Aqua Aerosol 5-Min L2 Swath 10km	5,320,157	5,462.87
3	MOD04_L2	MODIS/Terra Aerosol 5-Min L2 Swath 10km	4,710,287	5,248.00
4	TRMM_3B42	TRMM 3B42 3-Hour 0.25deg x 0.25deg and Other-GPI Calibration Rainfall	3,611,579	3,584.12
5	MOD14	MODIS/Terra Thermal Anomalies/Fire 5-Min L2 Swath 1km	3,053,976	694.65
6	AIRIBRAD	AIRS/Aqua L1B infrared geolocated radiances	2,901,691	111,146.01
7	MYD14	MODIS/Aqua Thermal Anomalies/Fire 5-Min L2 Swath 1km	2,775,012	653.30
8	MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km	2,771,007	124,618.63
9	PODAAC 167	Jason-1 Operational Sensor Data Record (OSDR)	2,496,794	1,073.53
10	NSIDC-0032	DMSP SSM/I Pathfinder Daily EASE-Grid Brightness Temperatures L3	2,485,467	1,808.74

GES DISC Product

GES DISC distribute three of the top 10 Products, including the number 1
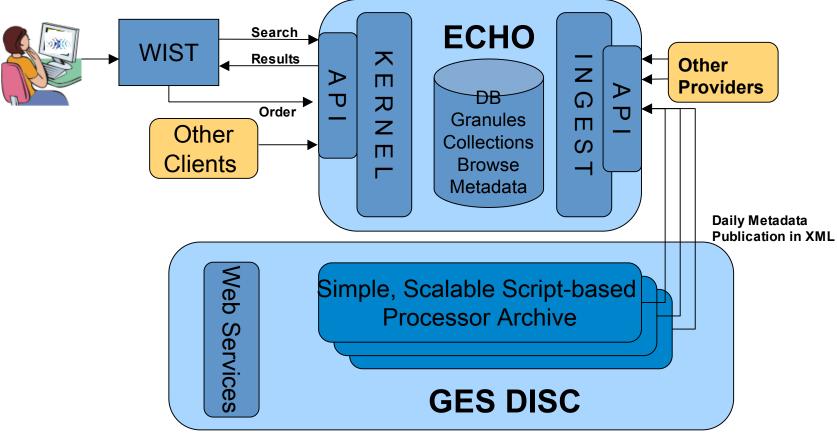
EOSDIS Customer Satisfaction Survey

- EOSDIS sponsors an annual independent customer survey in conjunction with the American Customer Satisfaction Index (ACSI).
- EOSDIS consistently exceeds the Federal Government average
- Ratings in the mid to upper 70s are considered "very good" by the rating organization, the CFI Group

NASA GES DISC
- 2008: 77
- 2007: 76

NASA EOSDIS
- 2008: 77
- 2007: 75

Federal Government (Overall)
- 2008: 69

E-Business News & Information (Public/Private Sectors)
- 2008: 72

Axis: 30 40 50 60 70 80

11

WIST/ECHO and GES DISC Systems
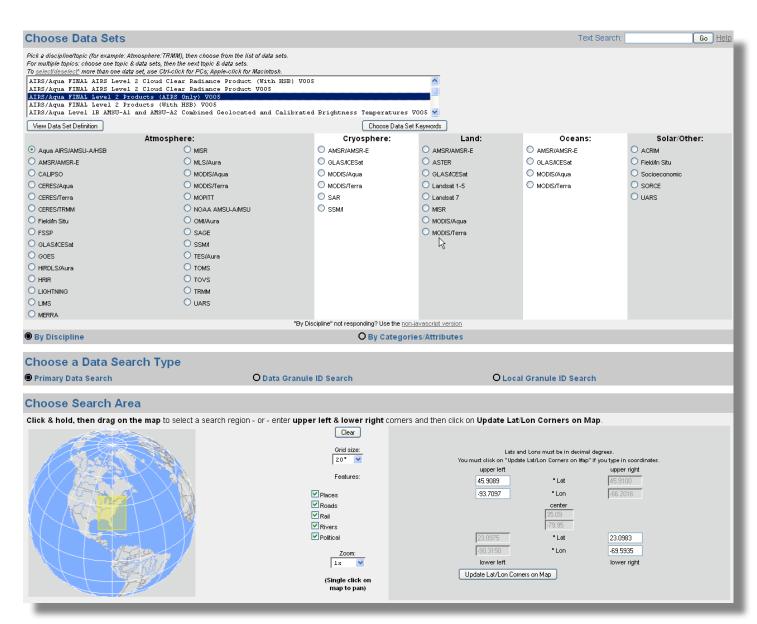
WIST (Warehouse Inventory Search Tool) and ECHO (EOS Clearing House)
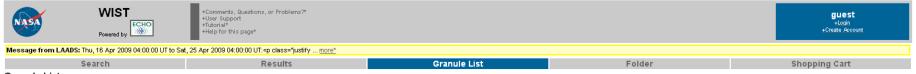
- Provides a data granule-level metadata for all NASA EOS data.
- Enables common searches of earth science relevant data across all NASA on-line data access systems.

GES DISC data search in WIST

AIRS Search Results

Core and Community Capabilities - NASA's View on Earth Science Data Systems Responsibilities

CORE	COMMUNITY
Projects Subject to Programmatic Review	**Projects Competitively Selected** (e.g. REASoNs, ACCESSs MEaSUREs)
Substantive NASA Oversight	**'Light Touch' Oversight w/Significant Community Involvement**
Tight Integration of Data System Tools, Services and Functions	**Community-based Tools and Services Loosely-Coupled**
Employ Well Established Information Technologies	**Employ 'Edgy' or Emerging Technologies**

Managing Operations

- Every year ESDIS and GES DISC prepare a work plan that covers the current year and next year
  - Looking for continued improvements in operations while maintaining a high level of customer satisfaction
  - UWG input regarding priorities is incorporated into workplan
  - Includes inputs to 5 year budget for ESDIS Budget Plans
    - FY10-15 submission prepared for Apr 2009
    - Current budget projection is stable (i.e., flat)
- Continue to interact with ESDIS project efforts, e.g. EMS and ECHO updates, network activities, security, etc…
- Participate in weekly DAAC Manager telecons; meetings with other DAAC managers; participate in Earth Science Data Systems Working Group and similar meetings
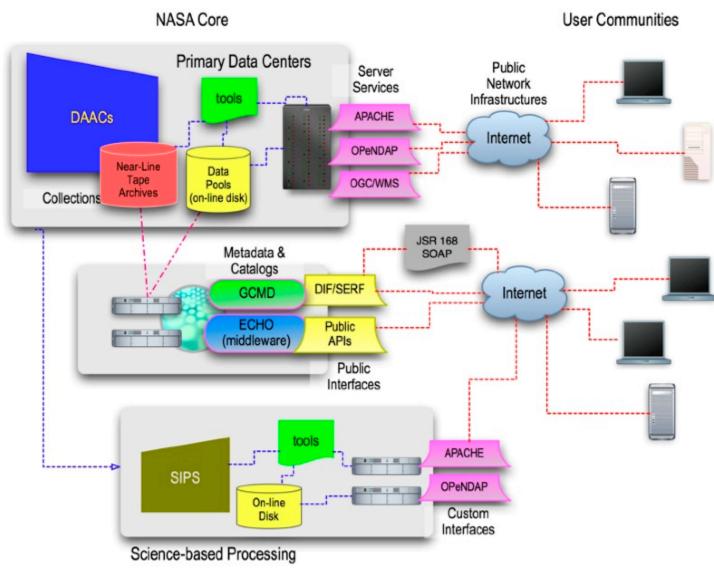
Some Next Steps for ESDIS

- Development of the Near Real Time Processing System

- International missions, e.g. ALOS and GCOM-W

- Support data management for decadal missions

- Planning some focus activities on data access

- Continue development of standards

- Distribution and management of MEaSURES datasets as they mature
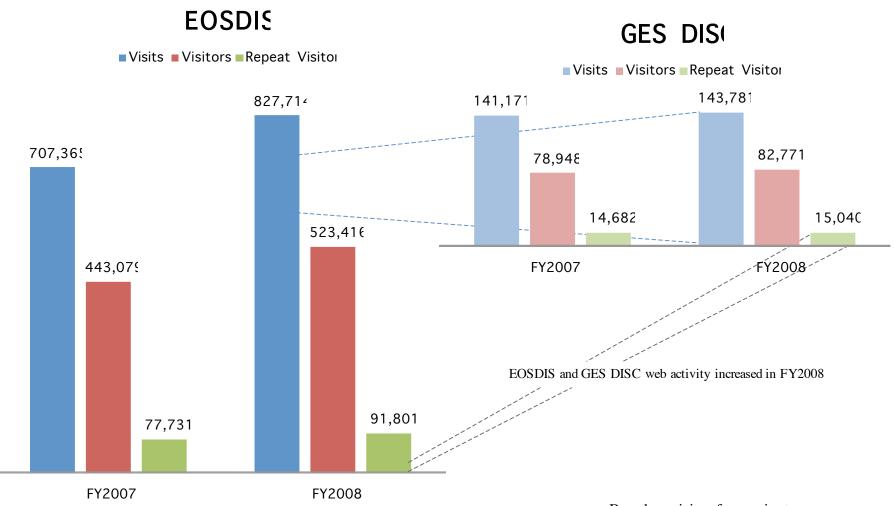
backup

NASA Earth Science Interoperable Data Architecture
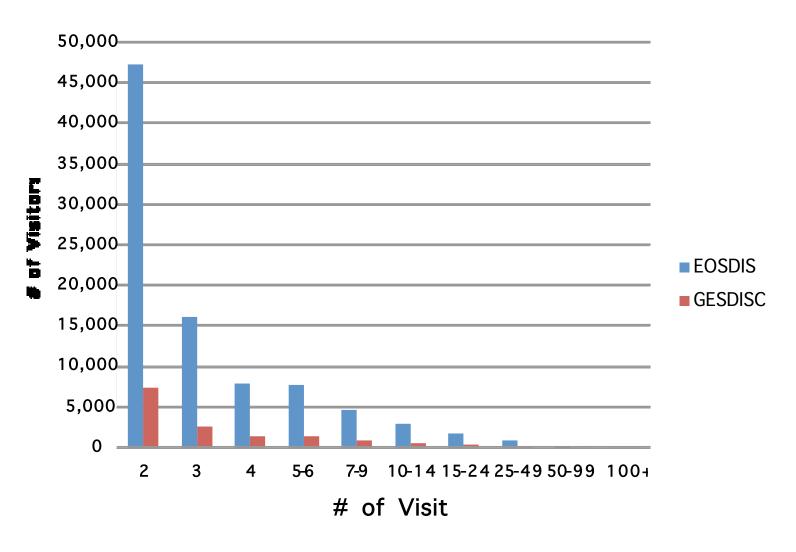
Web Activity Trends 2007-2008

EOSDIS

Visits Visitors Repeat Visitor

827,714

707,365

443,079

523,416

77,731

91,801

FY2007   FY2008

GES DISC

Visits Visitors Repeat Visitor

141,171   143,781

78,948   82,771

14,682   15,040

FY2007   FY2008

EOSDIS and GES DISC web activity increased in FY2008

Based on visits of one minute or more
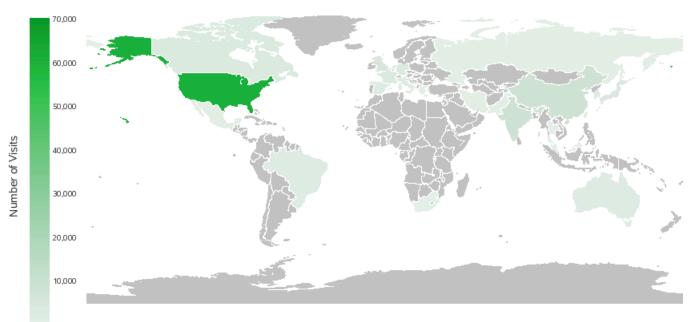
FY2008 Repeat Web Visitors from start of FY

*Visits of one minute or more

FY2008 Visits to GES DISC Web Sites
Top 20 Countries

	Country	Visits
1	United States	60,951
2	China	8,480
3	India	7,884
4	Great Britain	4,401
5	Japan	4,272
6	Canada	3,448
7	Germany	3,103
8	France	2,744
9	Brazil	2,327
10	Italy	2,263
11	Australia	2,220
12	Korea, Republic of	2,116
13	Spain	1,704
14	Indonesia	1,525
15	Netherlands	1,486
16	Taiwan	1,219
17	Russian Federation	1,169
18	Mexico	1,061
19	Pakistan	917
20	Hong Kong	840

American Customer Satisfaction Index

➢EOSDIS surveys are performed by CFI Group (Claes Fornell International) through a contract with the Federal Consulting Group (and DOI)

> ➢NASA provides CFI Group a list of **37,229** email addresses collected in the previous 12 months (up from 23,827 addresses in 2007)
> ➢GES DISC provided **3,308** addresses

➢CFI sent email invitations in August and September 2008.

> ➢Users completed **2,763** surveys (~9%)
> ➢GES DISC users completed **173** responses (~7%)

➢CFI briefing to ESDIS (and DAACs) in November included detailed results for further analysis
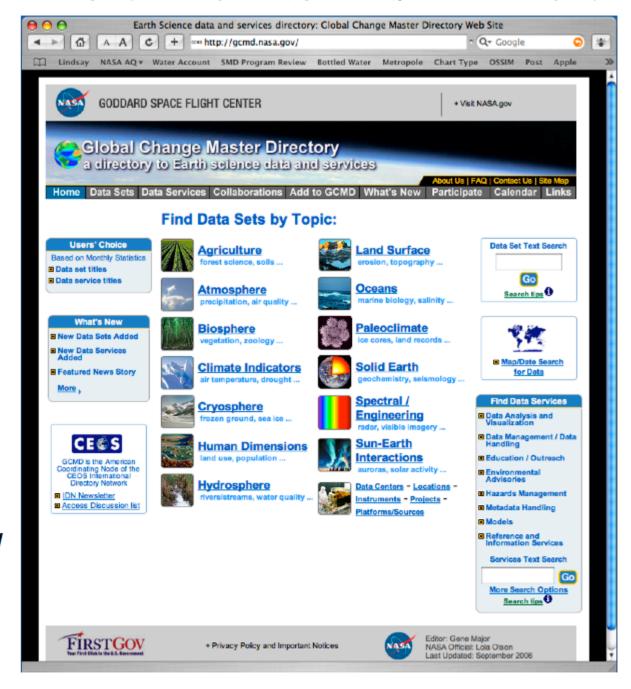
GLOBAL CHANGE MASTER DIRECTORY

Provides a catalog and portal for data discovery of NASA and other publicly available environmental data and services.

- Over 17,000 metadata records
- Over 1,000 worldwide data providers
- Average 5 million visits per month

http://gcmd.nasa.gov/

NASA
SCIENCE MISSION DIRECTORATE

ECHO Status – Holdings and Partners

- Current Holdings
  - Collections   2,674
  - Granules   85 million
  - Browse   28 million
- Data Partners
  - Operational Public: 10
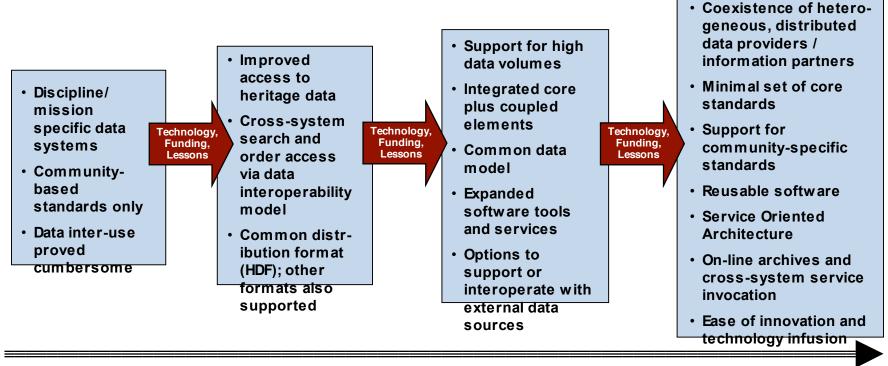 - Test: 1   (GHRC DAAC)
- Client Partners
  - Operational   3 (WIST, SNOW-I, ESA)
  - In evaluation or test   2 (WECHO, AQUA)
  - Active development   1 (WISRD)

Evolution of Data System Features

- Discipline/mission specific data systems
- Community-based standards only
- Data inter-use proved cumbersome

Technology, Funding, Lessons

- Improved access to heritage data
- Cross-system search and order access via data interoperability model
- Common distr-ibution format (HDF); other formats also supported

Technology, Funding, Lessons

- Support for high data volumes
- Integrated core plus coupled elements
- Common data model
- Expanded software tools and services
- Options to support or interoperate with external data sources

Technology, Funding, Lessons

- Coexistence of hetero-geneous, distributed data providers / information partners
- Minimal set of core standards
- Support for community-specific standards
- Reusable software
- Service Oriented Architecture
- On-line archives and cross-system service invocation
- Ease of innovation and technology infusion

<1990   **mid-1990s**   **Late 90s to present**   **Near-Future**

Lessons learned coupled with user working group and advisory council advice and ideas supports a continuously evolving data system with growing capabilities for core and community users

26